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Study of Thoroughbred Workers: Physical Health, Mental Health, and Income

Marina Byrd
University of Kentucky

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Advisor Dr. J.S. Butler

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Executive Summary:

Horse racing is a well-known sport and the part of the horse industry best known to the public; however, there is little information on the health status and health needs of people who work in this business. Past research shows that the thoroughbred worker population faces a myriad of health challenges. Swanberg *et al*. (2013) studied demographics, working conditions, and health of Latinos who work on thoroughbred farms in the United States by analyzing phone interviews, face-to-face interviews, and injury logs. The majority of injuries in this study are general injuries such as getting kicked or injuring fingers.

This study will estimate the effect of access to insurance on the health of people who work in the horse racing industry. Other research questions of the study are whether socioeconomic factors such as age, gender, race/ethnicity, income, and education level impact the health of the workers. Finally, the study will estimate the relationship of job title of the workers to overall health.

This study uses two survey tools, the SF-12v2® Health Survey and a background demographic survey to gather data from 73 thoroughbred workers. The majority of the sample are hotwalkers or grooms. Additionally, about half of the respondents elected to complete the English version of the survey and the other half decided to complete the Spanish version.

The results fall into two categories, mental health and physical health. The first main finding is language impacts mental health. Many of the participants who chose to fill out the survey in Spanish knew very little English or none at all and needed to ask another worker to translate. Additionally, Hispanics who were fluent in English often elected to complete the Survey in English. On average, participants who completed the survey in English scored higher on mental health measures than those who completed the survey in Spanish. This demonstrates that language is a barrier to achieving higher levels of mental health. Implementing or strengthening existing English as a Second Language (ESL) classes and posting translation posters around work areas could help ease the language barrier.

The second main finding is participants who did not have insurance or did not respond to the insurance question reported better general physical health than those with insurance. Possible reasoning for this is the self-selection of insurance, those who know they are healthy may choose not to purchase private insurance or seek jobs that offer insurance. Educating workers on the importance of health insurance to plan for risk and helping workers navigate Kynect, the Kentucky state health insurance exchange, could help lead to higher rates of insured thoroughbred workers.

The horse industry is an important part of the United States economy. The industry contributes an annual $39 billion dollars of gross domestic product to the economy with racing contributing $10.6 of goods and services ("National," 2010). In Kentucky, the total value of goods and services produced by the horse industry is $2.3 billion ("State," 2010).

Currently, there is little information on the number of workers in the industry. The Current Population Survey of the United States Census Bureau categorizes horse industry workers within a larger group of spectator sports including football. Because the report does not break down labor statistics by subgroups within the spectator sports, it is difficult to estimate the number of thoroughbred racing workers.

To gather more information on labor in the horse industry, the American Horse Council Foundation completed a study in 2004. The study found the horse industry employs 701,946 total workers with 453,612 full-time jobs. The racing industry employs a total of 383,826 people which is the largest employment sector of the horse industry as a whole ("National," 2010). The Kentucky horse industry employs 51,900 Kentuckians with full-time jobs ("State," 2010).

Horse racing is a well-known sport and the part of the horse industry best known to the public; however, there is little information on the health status needs of people who work in this business (Hendricks *et. al*., 2009). Furthermore, the different job titles and responsibilities may impact the risk factors associated with the sport. The Centers for Disease Control states many "risk factors are involved when a 115-pound jockey rides an 1,100 pound animal running 40 miles per hour. Besides the jockey, other workers (e.g., backstretch workers, farriers, grooms, trainers, starting gate attendants, etc.) have their own safety and health

considerations"(Hendricks *et al*, 2009). Note that 40 miles per hour is very fast, a near-record speed, but the point is correct that jockeys are at risk of injury.

The health insurance available to thoroughbred industry workers varies by job role and by state. Only five states offer workers compensation to jockeys (Hendricks *et al.,* 2009). Many states classify jockeys as independent contractors which mean they may not be included under the Occupational Safety and Health Administration or the Department of Labor's Wage and Hour Division (Gitomer, 2005). Furthermore, according to Opacich and Lizer (2007) other workers in the thoroughbred racing industry such as backstretch workers are also often independent contractors. Backstretch workers can include grooms, hotwalkers, and exercise riders. Due to the independent contractor status of backstretch workers and jockeys, these workers do not fall under minimum wage laws and can be exempt from workers compensation and social security benefits (Opaciah and Lizer, 2007).

An exploratory study published in 2010 examined the health status of 84 backstretch workers in the thoroughbred racing industry. Researchers used oral surveys to collect information on demographics, most recent visits to the doctor and dentist, and open-ended questions to elicit health concerns. The study was exploratory due to a lack of research on the topic and researchers reported descriptive statistics because of the exploratory nature of the study (Castañeda, Kline and Dickey, 2010).

Demographic information included gender, age, and job title. The population was male dominated (more than 83 percent male). The mean age was 39 years with a range of 18 years to 78 years. Most of the backstretch workers studied were grooms (60.7 percent). The role of a

groom is to clean and prepare the horse for exercise or races. Grooms can also muck out stalls and feed horses. Hot walkers composed 17.9 percent of the study population. Hot walkers walk horses after exercising or racing to cool down the horses, similar to how a human athlete must walk to cool down after running. Exercise riders made up 8.3 percent of the population. Exercise riders ride the horses for their daily morning exercise. Trainers composed 4.8 percent and assistant trainers made up 3.5 percent of the population. Trainers and assistant trainers plan workouts, manage horse owners, and typically employ other backstretch workers. The study also surveyed a small number of maintenance workers (2.4 percent) and jockeys (2.4 percent). Maintenance workers typically repair barns and perform general maintenance and lawn work. Jockeys ride the thoroughbred horses in races. The data set did not include any outriders as none were interviewed.

The study also determined the country of origin of the study population. The largest number of workers emigrated from Mexico (46.4 percent). The next largest groups were United States citizens (25 percent) and Guatemalan immigrants (17.9 percent) (Castañeda, Kline and Dickey, 2010).

The income among the workers varied by job title, but one similarity among all workers is income typically depends on earnings from races and the racing season (Castañeda, Kline and Dickey, 2010). In the exploratory study, hotwalkers earned the least amount of money at $100 to $300 per week. Grooms made around $300 to $500 per week. The average earnings of exercise riders was $500 per week with a range from $200 to $1,000. The researchers did not report the other earnings of trainers, assistant trainers, and jockeys due to large inconsistencies; however they state the earnings of these groups were typically higher than grooms, hotwalkers, and

exercise riders. Additionally, only one participant, a trainer, had health insurance provided by Medicare.

Descriptive statistics of self-reported health concerns show a variety of health problems. The most common self-reported issue was injury or pain of muscles, joints, and/or ligaments such as back or leg pain and wrist, knee, or rotator cuff injuries. Out of the 84 respondents 21.4 percent reported muscle, joint, and/or ligament concerns. The next most common concern was gastrointestinal issues (13.1 percent) including ulcers and parasites. A typical response in regards to health concerns was described by a participant as:

> "There are many nights when I can't sleep and I feel like I am going to die," he said. Luís obtained medication when he last saw a doctor, three years ago in Colorado. "He just told me what I had, and gave me some pills." Luís attributed job instability to not being able to improve his health, and said that he wished he could go to a hospital to become well again (Castañeda, Kline and Dickey, 2010).

Swanberg *et al.* (2013) studied demographics, working conditions, and health of Latinos who work on thoroughbred farms in the United States. Swanberg *et al.* (2013) collected data by three methods: phone interviews, face-to-face interviews, and injury logs. The study population consisted of 22 farms with an average of 34 workers per farm (Swanberg *et al*, 2013).

In this exploratory study, the majority of the study population consisted of grooms, night watchmen, and maintenance workers. The study defined grooms using a common definition of "grooms are generally assigned to work with horses and are responsible for spreading and cleaning bedding in stalls, feeding, brushing, bathing, and administering medicines to horses, as well as turning them out to pasture" ((Swanberg *et al.*, 2013). Maintenance workers typically repair and mend the barn and pastures. Night watchmen monitor the horses and premises at

night. Males made up 83.3 percent of the study population. Hispanics consisted of 49.8 percent and Whites consisted of 46.7 percent of the population (Swanberg *et al.,* 2013).

Researchers found a total of 284 injuries. The majority of the injuries were categorized as general injuries (29.2 percent). This category included injuries where a "specific diagnosis was not determined, but general pain or hurt was described (e.g., 'kicked by yearling', 'injured right middle finger')" (Swanberg *et al.*, 2013).

The National Institute for Occupational Health and Safety (NIOHS) of the Centers for Disease Control (CDC) held a meeting titled "Safety and Health in the Horse Racing Industry and Best Practices" in 2007 to gather public input about health concerns of thoroughbred industry workers. Sixteen agencies were represented during the meeting with a total attendance of 26 individuals.

At the meeting experts in the field presented on health concerns facing thoroughbred industry workers. Carl Hornung, an epidemiologist and Professor of Medicine at the University of Louisville School of Public Health and Information Sciences, presented results from a health survey given during a 2006 meeting of the Jockey's Guild ("Public", 2007). The study consisted of 51 jockeys. Researchers found that out of the 51 jockeys, 27 percent reported a total of 33 injuries over the past month. 14 percent of jockeys reported there was not a physician present at the time of injury and two reported an ambulance never responded to their injuries. Additionally, the survey found that 26 percent reported there was not a physician onsite to perform emergency medical care and 12 percent said they suffered permanent damage that could have been avoided with better medical care ("Public", 2007).

Other health issuesincluded a majority of the jockeys reporting symptoms of depression (62 percent). A smaller number of jockeys smoke (40 percent), but a majority of jockeys reported experience of second hand smoke in close proximity to other jockeys (54 percent). A large number of jockeys said they used alcohol (89 percent) and 25 percent reported drinking daily. Additionally, in order to meet strict weight requirements for racing 22 percentof jockeys reported purging, 35 percent said they skipped meals, 31 percent reported using a sauna, and 41percent reported running. Jockeys also reported using diet pills (60 percent), water pills (60 percent) and laxatives (60 percent) to meet weight requirements.

After the meeting, NIOHS created a docket to collect further public opinion (Hendricks *et al.*, 2009). The docket gathered nine submissions. Public concerns included weight control methods, head trauma, exposure to lead, a lack of onsite emergency care, and the gap of health between the general population and the thoroughbred racing workers (Hendricks *et al.*, 2009).

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Survey Instrument:

This study used two surveys to gather information. The first survey is the Quality Metric's SF-12v2® Health Survey. This survey is a reliable self-reported measure of physical and mental health. The SF-12® Health Survey is ideal for this study because it is quick to fill out yet

comprehensive. The SF-12® Health Survey takes between two to five minutes to complete. For this study, the SF-12® Health Survey was in both English and Spanish.

The second survey is a background information survey. This survey collects demographic information including gender, race, age, education level, income level, and family characteristics. Additionally, the survey collects information about job title. The job titles include groom, hot walker, exercise rider, jockey, trainer, administrative/clerical, and other. Furthermore, the survey asks if respondents have health insurance and if so, which type of health insurance. This survey takes about five minutes to complete. The background information survey was also in both English and Spanish.

This study combines both the SF-12® Health Survey and the background survey to gather an overall self-reported health measure and important factors that could influence overall health. Together, the surveys take about 10 minutes to complete.

Procedure:

The researcher partnered with the Race Track Chaplaincy of America, a nonprofit agency that provides services to workers in the racing business at 48 different racetracks in19 states. With the help of the nonprofit, the researcher visited Keeneland Racing Track in Lexington, Kentucky and the Training Center in Paris, Kentucky to collect surveys.

The researcher collected information by walking through the backside of the tracks and asking workers to participate in the study. Many workers responded favorably to the study and encouraged coworkers to participate as well. The researcher noticed that many of the participants

who chose to fill out the survey in Spanish knew very little English or none at all. The majority of the time, the researcher needed to ask another worker to translate or present the Spanish speaking participant with a letter in Spanish explaining the research. Additionally, Hispanics who were fluent in English often elected to complete the Survey in English and helped to explain the survey to non-English speaking Hispanics. The researcher passed out surveys to a group of workers barn by barn. Due to the brevity of the survey, the researcher waited in the barn until all surveys were completed before moving onto the next barn. The response rate was 63 percent. A majority of the workers who refused said they were too busy working or getting horses ready to fill out the survey.

Participants:

Participants are people who work in the thoroughbred racing business. About half of the participants work in Kentucky year round at the training center. The other half travels from track to track across the country to attend different racing meets. The traveling workers were just moving into the barns at Keeneland while the researcher distributed and collected surveys.

Model:

I use two regression models, one to analyze factors affecting wages and one to analyze health outcomes. First, I estimate an income equation to estimate the effects of job title, education level, and age on income. Income is not a health outcome in itself, but income is strongly associated with health outcomes. Given the availability of reported income, an estimated equation can evaluate whether job type, education, or age influences income. This is useful in itself and can be compared to the direct effects of those same factors on health. The

data are not reported as point values but rather as intervals. An old but uncommon methodology called interval regression exploits correctly the categorical salary data.

Researchers often convert intervals into continuous midpoints, but this estimation fails to estimate the true salary and does not result in consistent estimates except in the unlikely event that the interval means are guessed correctly a priori (Stewart, 1983). The regression interval model estimates a conditional mean and conditional variance to estimate the unknown dependent variable, salary (Stewart, 1983).The interval regression model is a typical linear regression with a disturbance term assumed to follow a normal distribution, with ranges specified as in probit or ordered probit. The coefficients have typical regression interpretation.

$$y_i = X_i'\beta + \mu \; i = (1...n)$$

The unknown dependent variable, salary, is y_i. The term $X_i'\beta$ contains explanatory variables which are represented by X_i. The distribution of the unknown dependent variable y_i is determined by:

$$y_i | x_i \sim N(x_i'\beta_i, \sigma^2) \; i = (1...n)$$

The unknown dependent variable falls into an interval on a continuous line. A conditional mean and variance σ^2 can be used to estimate the unobserved value of the dependent variable.

Next,I estimated ten different ordinary least squares regressions to determine if explanatory factors influence the ten different health measures from the SF-12v2® Health Survey. Robust estimation is used to correct for heteroscedasticity of the error terms where:

$$y_i = X_i'\beta + \varepsilon_i$$

I estimated ten different regressions with ten different dependent variables reflecting aspects of physical and mental health. All regressions include the same set of explanatory variables. Measures of mental health from the SF-12v2® Health Survey are vitality, social functioning, role emotional, mental health, and an overall mental component summary score. Measures of physical health include physical functioning, role physical, bodily pain, general health, and an overall physical component summary score.

Table 2: Dependent Variables

Mental Component Summary (MCS): overall mental health	**Physical Component Summary (PCS):** overall physical health
Vitality:determines how health impacts liveliness	Physical Functioning: defines how physical health limits activities
Social Functioning: determines how health impacts social life	Role Physical: determines how physical health impacts productivity over a four week recall period
Role Emotional: determines how anxiety or feelings of depression impact productivity over a four week recall period	Bodily Pain: determines how bodily pain affects activities
Mental Health: determines how participants judge their mental health	General Health: determines how participants judge their overall health

The explanatory variables include demographic and family information including gender, age, language(English or Spanish), dependent children, and if married or living with a partner. Language is a proxy for both race/ethnicity and for fluency in speaking English. The language explanatory variable is a proxy for ability to speak English fluently and will estimate if language is a barrier to health.

Job type is also an explanatory variable. I combine grooms and hotwalkers into one category due to the similar nature of the jobs. Often time, workers switch between working as a groom or hotwalker and some respondents picked both categories. I also combine both exercise riders and jockeys into one category due to the small number of jockeys in the sample. Finally, the category of trainers includes both trainers and assistant trainers.

The remaining explanatory variables I test are education and insurance coverage. Education is in four categories, less than high school, high school degree/GED (used as the category for comparison), some college, or professional degree. Insurance has three possible categories, has insurance, does not have insurance, or elected not to answer the insurance question. The last could be a proxy for no insurance, but I keep the answers separate.

Descriptive Analysis:

The SF-12® Health Survey compares the health of the study population to the general population t-score. The t-score transforms individual participant scores into a standardized form to compare individuals to the rest of the distribution. The t-score estimates population parameters to change individual scores into a standard form without knowing the population mean or standard deviation.

The participant is above the general population t-score if the participant's score is above the score at the higher end of the 95 percent confidence interval. The participant is at the same health level of the general population if the health score is within the general population 95 percent confidence interval. The participant is below the health level of the general population if

the health score is below the score at the lower end of the 95 percent confidence interval. This is a typical reference range definition used in medical tests.

The Physical Component Summary (PCS) of the SF-12® Health Survey, which calculates the general physical health, shows 43 percent of thoroughbred workers have better physical health than the general population, 42 percent scored about the same in physical health as the general population, and 15 percent scored below the physical health score of the general population. In general, the thoroughbred workers are in better physical health than the general population which is an unexpected finding due to the high risk of physical injury which comes from working with horses. However, thoroughbred workers in all job titles engage in almost constant physical activity including briskly walking horses, mucking out stalls, carrying water buckets, and riding.

The Mental Component Summary (MCS) of the SF-12® Health Survey, which determines the general burden of mental health, shows 49 percent of thoroughbred workers have better mental health than the general population, 28 percent have the same level of mental health as the general population, and 22 percent have worse mental health than the general population. In general, thoroughbred workers have better mental health than the general population. Again this is an unexpected result due to the findings of depression in related work.

The SF-12® Health Survey also compares the study sample population to the general population t-score for more specific health measures than the general physical and mental health scores. The Physical Component Summary is an overall score of physical health. Table 3 shows the Physical Component Summary t-score for the thoroughbred worker population is 51.9 which

is above the general population norm of 50. Additionally, the other measures of physical health, Physical Functioning (52.3), Role Physical (50.6), Bodily Pain(50.4), and General Health (51.9) are above the general population norm of 50. Physical Functioning and the Physical Component Summary scores are statistically significant at the .05 level as shown in Table 3.

The Mental Component Summary is an overall score of mental health. Table 3 demonstrates the Mental Component Summary t-score for the study sample is 52.4, also above the general population norm of 50. Other scores demonstrating mental health, Vitality (59.5) and Mental Health (52.3) are above the general population norm. The two remaining mental health measures Social Functioning (49.8) and Role Emotional (49.6) are just below the general population average. Vitality, Mental Health, and the Mental Component Summary score are statistically significant at the .05 level as shown in Table 3.

Tables 3 and 4 summarize the descriptive statistics of the sample. The majority of the sample are males (*68 percent*) and English speaking (*53 percent*). The majority of the sample works as grooms or hotwalkers (*33 percent*) followed by trainers (*30 percent*) and finally riders (*15 percent).* About half *(52 percent)* responded they do not have insurance or did not respond to the insurance questions and the other half has some type of health insurance coverage, including insurance provided by employer, insurance through spouse, Medicaid, Kynect, or privately purchased insurance.

Table 3: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max	P Value
Physical Functioning	67	52.302	8.426	25.58	57.06	*0.028
Role Physical	70	50.691	7.838	23.61	57.46	0.463
Bodily Pain	68	50.435	7.985	21.66	57.73	0.655
General Health	70	51.926	8.637	23.90	63.66	0.066
Vitality	70	59.464	9.001	29.39	68.74	*0.000
Social Functioning	67	49.865	8.271	30.22	56.90	0.894
Role Emotional	70	49.598	8.068	25.09	56.28	0.678
Mental Health	70	52.319	9.576	29.79	64.21	*0.046
Physical Component Summary	65	51.946	7.206	30.65	65.53	*0.033
Mental Component Summary	67	52.355	8.832	30.79	66.06	*0.032
Age	69	34.732	16.097	15	66	.
Age Squared	69	1461.678	1242.607	225	4356	.

**P < 0.05*

Table 4: Summary Statistics

Variable	Obs.	Frequency	Percent	Std. Dev.
Males	77	46 males *(21 females)*	68.7	0.467
Children	72	21 Yes *(51 No)*	29.2	0.458
Partner	70	29 Yes *(41 No)*	41.4	0.496
English Speaking	70	37 English (*33 Spanish)*	52.9	0.503
Groom/Hotwalker	72	24	33.3	0.475
Rider	72	11	15.3	0.362
Trainer	72	18	30.6	0.705
Less than High School	72	30	41.7	0.496
High School	68	26	38.2	0.490
College	72	15	20.8	0.409
Advanced Degree (a Vet)	72	1	1.4	0.118
No Insurance	71	26	36.6	0.485
Insurance No Response	72	11	15.3	0.362

**P < 0.05*

Income Equation Results:

Results from the interval regression support the validity of the data because the wage findings match the typical wage hierarchy among different job titles. On average, grooms and hotwalkers earn $20,126 on average less than other positions. Trainers earn $8,893 more on average than other positions. The results match the general compensation of thoroughbred racing workers. Grooms and hotwalkers typically require less specialized knowledge than other positions and are often compensated less. Trainers work directly with thoroughbred owners and usually hire and manage grooms, hotwalkers, and exercise riders. Education level and age have no significant impacts on salary, which are unusual results for a wage equation, but this is a sample of racetrack workers. In Table 2, sigma is an estimated standard deviation of wage, which cannot be estimated in the usual basic way because data are in intervals.Because job title most often significantly impacts income, job title can function as a proxy for wage in the health outcome analysis. Consequently, apparent effects of job title could be either the work or the income. Any health impacts of age and education subsequently can be inferred to represent direct effects on health, as there appear to be no indirect effects through income.

Table 5: Interval Regression Results: Income

Number of Obs = 51	**Coefficient**	**Robust Std. Error**	**P Value P >|z|**
Groom/Hotwalker	-20126.490	7610.714	*0.008
Rider	-1018.872	5979.131	0.865
Trainer	8893.601	2614.507	*0.001
Less than High School	-9178.356	8042.572	0.254
College	-2181.209	7187.587	0.762
Professional Degree	37254.970	*only one prof degree (a Vet)	
Age	129.333	170.924	0.449
Constant	26156.070	6905.057	0.000
Sigma	15187.400	5089.891	
*p<0.05			

Using the income equation, it is possible to predict the point value of income, and using that prediction for 58 workers, to correlate that with the SF scores. Two of the correlations are statistically significant (at the 5 percent level, 0.26 with 61 observations), both positive: general health (0.29) and social functioning (0.35). The predicted income is also positively correlated (0.32) with having insurance. The income is mostly job title, so in the subsequent regressions job title proxies both the work and the income**.**

Physical Health Results:

Only one measure of physical health has explanatory variables with statistically significant coefficients at the 95 percent confidence level. The general health measure, which seeks to determine how participants judge their overall health, is reported in Table 6. Five characteristics are statistically significant at the .05 level. On average, being a groom or hotwalker decreases the general health score by 6.5 points. Additionally, being a rider decreased the general health measure by 6.1 points. Not receiving a high school degree or GED decreases the measure of general health by 6.5 points. Both having no health insurance coverage and not answering the insurance question increase the measure of general health. Those without insurance on average score 8.1 points higher than those with insurance. Those who elected not to answer the insurance question score 8.9 higher than those with insurance. Having insurance does not increase the general health of track workers.

Table 6: General Health (GH)			
Observations = 62 R Squared = 0.414	**Coef.**	**Robust Std. Err.**	**P Value |P>t|**
Male	1.976	2.588	0.449
Age	-0.624	0.454	0.176
Age Squared	0.006	0.006	0.292
English Speaking	3.021	2.783	0.283
Children	-3.308	2.438	0.181
Groom/Hotwalker	-6.504	2.250	*0.006
Rider	-6.189	2.945	*0.041
Trainer	-0.184	1.097	0.868
Partner	-0.137	2.018	0.946
Less than HG	-6.526	2.466	*0.011
Some College	-1.220	2.434	0.619
Professional Degree	3.147	2.425	0.201
No Insurance	8.129	2.192	*0.001
Insurance No Response	8.972	3.239	*0.008
Constant	66.018	9.001	0.000
***p<0.05**			

Mental Health Results:

Two measures of mental health contain statistically significant findings at the 95 percent confidence level. Role emotional determines how anxiety or feelings of depression impact productivity over a four week recall period. A high score on role emotional corresponds to lower levels of anxiety and depression, thus better mental health. Job type and language affect the role emotional score. The proxy for language shows English speakers are better able to cope with feelings of anxiety and depression when in order to be productive. The job title also has an impact on the measure of role emotional. Riders, on average, score 5.7 points lower and trainers score 4.2 points lower. Insurance has no effect.

The mental component summary also has statistically significant findings, but only one variable is statistically significant. The language proxy impacts the mental component summary

score with those who complete the English survey scoring an average of 10.8 points higher than those who complete the Spanish Survey. Insurance coverage and job type have no effect. A high score on the mental component summary corresponds to better overall mental health.

Table 7: Role Emotional (RE)

Observations = 60 R Squared = 0.351	**Coef.**	**Std. Err.**	**P Value |P>t|**
Male	-0.638	2.330	0.785
Age	-0.696	0.405	0.092
Age Squared	0.007	0.005	0.201
English Speaking	13.531	3.309	*<0.001
Children	1.180	2.775	0.673
Groom/Hotwalker	-4.387	3.210	0.178
Rider	-5.705	2.751	*0.043
Trainer	-4.279	1.121	*<0.001
Partner	4.171	2.088	0.051
Less than HG	3.805	2.843	0.187
Some College	-0.381	2.409	0.875
Professional Degree	3.458	2.932	0.244
No Insurance	-0.901	2.686	0.739
Insurance No Response	1.754	3.052	0.568
Constant	57.60367	6.371	0.000
***p<0.05**			

Table 8: Mental Component Summary (MCS)

Observations = 60 R Squared = 0.351	Coef.	Std. Err.	P Value |P>t|
Male	2.011	2.945	0.498
Age	-0.563	0.507	0.273
Age Squared	0.006	0.006	0.344
English Speaking	10.833	3.468	*0.003
Children	-0.538	3.388	0.875
Groom/Hotwalker	-1.594	3.828	0.679
Rider	-3.572	2.747	0.200
Trainer/Other	-2.539	1.313	0.059
Partner	-0.604	2.690	0.824
Less than HG	0.977	3.214	0.763
Some College	-1.151	2.821	0.685
Professional Degree	1.393	3.511	0.693
No Insurance	0.659	2.879	0.820
Insurance No Response	-3.583	3.907	0.364
Constant	57.869	9.776	0.000
***p<0.05**			

Discussion and Recommendations:

Generally, this study shows that the thoroughbred worker population is just as healthy as or healthier than the general population in several measures of physical and mental health. While this is a small sample, there are some findings that emerge from analyzing the ten different measures of health.

In two measures of mental health, the role emotional and the mental component summary score, the language proxy is statistically significant and in favor of those who elect to complete the survey in English. The language proxy shows that language is a barrier for non-English speakers. Specifically, non-English speakers on average score lower than English speakers for the level of anxiety and depression. The lower score indicates that non-English speakers report worse mental health than English speakers. One reason for this difference could be the anxiety

that stems from not fully understanding the directions from an English speaking boss or coworkers in a fast-paced environment.

One recommendation to alleviate the language barrier is to implement or strengthen existing English as a Second Language (ESL) programs for thoroughbred workers. Challenges that limit the effectiveness of ESL classes are the busy schedule of thoroughbred workers and communicating with workers that the classes are available. Another recommendation to ease the language barrier is to post Spanish to English and English to Spanish posters with terms that relate to the horse business and general sentences and words. Many of the bilingual speakers told the researcher they learned a new language from talking and working with others who speak another language. Posters that are easily accessible when on the job could help facilitate the learning process.

The job title of rider which includes jockeys and exercise riders also affects health, or the income resulting affects health. In both the physical measure general health and the mental measure role emotional, riders score lower. Riders often need to meet strict weight requirements to be eligible to ride. Often times, riders do not take in enough calories or use other tactics to meet weight limits, which could influence general physical health. Riders also have a high stress job because they are responsible for riding green (young and less trained), powerful thoroughbreds at high speeds. The inherent stress of riding green horses could impact the overall anxiety level of riders. While riders have higher anxiety and depression and worse general health, it is hard to tell why. One recommendation would be to hold focus groups with riders to determine what they view as lowering their general health and emotional health.

Finally, both those without insurance and those who did not respond to the insurance question select a higher level of general health than those with insurance. A possible reason for this result is self-selection of insurance. It is possible that those who are healthier decide not to purchase insurance or not to find jobs that offer insurance and those who know they have some sort of health problem seek out private insurance or jobs that offer insurance. If self-selection of insurance is the case, a recommendation would be to educate workers on the importance of health insurance to plan for risk and help workers navigate Kynect, the Kentucky state health exchange. The requirement to obtain insurance under the Affordable Care Act could also lead to more track workers having insurance, which could make the insurance cheaper on average.

Limitations:

One limitation of the study is it does not address citizenship status of workers which could influence the overall health of a person. It is estimated that there are currently 12 million people illegally in the United States (Okie, 2007). Research shows that immigrants face barriers including navigating a complex healthcare system, language barriers, cultural barriers, and often work for employers that do not provide health insurance (Okie, 2007).

A study of healthcare expenditures of immigrants shows that per capita health spending for immigrants is 55 percent lower than for people born in the United States. Additionally, per capita spending on children of immigrants is 74 percent lower than on children born in the United States. However, spending in emergency departments is three times higher than that of children born in the United States (Mohanty, 2005). This suggests that immigrants are less likely to visit a doctor on a regular basis due to possible barriers of fear of deportation, language

barriers, cultural barriers, and a lack of health insurance. It also suggests that immigrants are more likely to wait for a medical emergency to visit the emergency department which impacts the overall health of immigrants.

Another limitation is the effects of job title on health outcomes can be either from income or the job itself. It is difficult to separate job title from income because the income equation demonstrates that income is dependent on job title. With a larger sample containing participants from multiple states and tracks, it could be possible to determine how income and job title affect health outcomes separately.

The small sample size is another limitation, but there is little actual information about the topic, much less published research, so this is a contribution relative to the question. Collecting large sample sizes of thoroughbred workers is difficult because it has to be done with paper surveys. Thoroughbred workers rarely use email to communicate with their employers, thus there is no good way to reach a large sample of thoroughbred workers using electronic surveys.

Conclusion:

Collecting data for large samples of thoroughbred workers is a difficult task due to the busy nature and communication portals available to conduct research. Learning more about this population is important because they contribute to an important part of the economy and face challenges that can be alleviated. The main finding from this study is language is a barrier for non-English speaking thoroughbred workers. Implementing or strengthening existing ESL classes within racetracks can help ease communication barriers and the anxiety and health problems that stem from those barriers.

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